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DEPARTMENT OF EDUCATION ALBERTA

Program of Studies for the Junior High School

Interim

MATHEMATICS PROGRAM

A Curriculum Guide for the Teacher

Prepared and issued by the Curriculum Branch  
of the Department of Education, Alberta.

September 1950

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## JUNIOR HIGH SCHOOL MATHEMATICS

### Objectives

Mathematics is a powerful tool for use in the commercial, industrial and scientific world; it has countless values for every consumer; it is a guide in even the smallest financial transaction. But it is far more; it is a method of clear thinking and its cultural values form a base for the appreciation of many phases of our civilization.

It is hoped that the Mathematics Courses of the junior high school will help each student to develop:

1. His abilities to use mathematics in the work-a-day world, and in future school work.
2. His disposition and ability to use reflective thinking in the analysis and solution of social and personal problems.
3. His appreciation of the place mathematics plays in our modern civilization and of the contribution it has made to our cultural heritage.

Every teacher of Grades VII, VIII and IX Mathematics should read and frequently reread the introduction to MATHEMATICS FOR CANADIANS, Book 1, where the above ideas are set out for the students. The statement of point of view in the Elementary Program Bulletin II, page 113, should also be reread frequently.

The developments set out above may be regarded as the general objectives most applicable to the junior high school classes. They are in close conformity with the GENERAL OBJECTIVES FOR SECONDARY EDUCATION of the 15th Yearbook of the National Council of Teachers of Mathematics. These general objectives of the 15th Yearbook may be summarized as follows:

- (1) To develop the ability to think clearly.
- (2) To develop the ability to use information, concepts, and general principles.
- (3) To develop the ability to use fundamental skills.
- (4) To develop desirable attitudes, especially
  - (a) Respect for knowledge
  - (b) Respect for good workmanship
  - (c) Respect for understanding
  - (d) Socialmindedness
  - (e) Openmindedness
- (5) To develop a wide range of interests and appreciations.

The reader is referred to Chapter 2 of the 15th Yearbook for an elaboration of the foregoing objectives and to Chapter 3 of the same book for their more specific applications to mathematics.

### Organization

In each grade of the junior high school the Mathematics course should be built around the topics of the text. This does not mean that every pupil should work through the text page by page. Proper coverage of the course is considered to involve a familiarity with each topic, not necessarily the completion of every problem in the text and not necessarily completion of the topics in the order given them in the text. It is hoped that most teachers will show initiative in the organization of the topics and in their presentation.

Many classrooms will have at least three learning groups. In a single-grade classroom one might expect to find a small group who would require special remedial treatment, a middle group, and a highly competent group which should be encouraged to undertake extensive extra activities, research topics, mathematical recreations, etc. The same variation of treatment according to needs may be attained in some classrooms by the teacher dealing directly with each individual without formal division of the class. Diagnostic testing will be used to discover the needs of each pupil for remedial work; the grouping will change from time to time. When a class is divided it is essential that the remedial group be well motivated and made to feel that the division is for their benefit. Merely dividing the class without thorough remedial teaching and encouragement is apt to have bad psychological effects and to be harmful. Some teachers improve the psychological approach by letting the pupils decide whether to join the remedial group or not.

Reference books are listed on a later page. These will be useful as sources of supplementary exercises for remedial work, and for enrichment material for those pupils who may be able and willing to go beyond the work of the text. Given proper motivation and encouragement the superior students will find challenging material in the Betz Series and many excellent illustrations and examples in the other books. Students who show special interest in mathematics, or who aspire to university training can be led to do this kind of work in proportion to their abilities and to the time they can find for it.

### Suggestions

#### I Mathematics should encourage good language usage:

- a In problem solving, the emphasis should be on the thinking process. Pupils should be encouraged to use the new technical words which they meet. Statements should be used to explain the solution and to state the answer. When a pupil explains how to get a result, he should use names of quantities rather than numbers. The use of the correct unit name for the answer is another important element in clear thinking.
- b Instruction in the reading and in the analysis of problems should be undertaken by the Mathematics teacher. The best techniques for the teaching of reading should be used, e.g.:



- (1) Word study - development of the necessary rich associations of the new word should be established by its use in context, and by several examples; formal definition would not always be required; in any case the definition should grow out of the examples.
- (2) Directed reading to isolate (a) the main idea of an explanation, (b) the facts given in a problem, and (c) the thing required in a problem.

It is suggested that pupils be taught to write down the names of the quantities involved in a problem; after that, they would write in the given values of these quantities. In Grade IX they would represent the unknown. Other quantities could be represented by using the relationships given or implied in the data. The pupil should be taught that where all the quantities have been represented, he should look for one more relationship which would give him an equation.

- c. Oral and written expression should be undertaken in connection with geometric construction in Grades VII, VIII and IX.
- d. In equation solving for Grades VIII and IX the thinking process, not the answer, is the important consideration. The equation is a balance. It should be continually emphasized that whatever operation is useful for isolating the unknown is performed on both sides of the balance. Trick procedures for getting the answer (such as transposing and cross multiplication) should be excluded from Grade VIII and if used in Grade IX work, should be limited to the outstanding students; no pupil should use a trick method of securing answers unless he is able to explain the derivation of the trick. In all oral work on equations full and careful statements should be expected from the pupils. Many good teachers, at the early stages of the learning process, ask for complete written statements of each step in a solution, e. g.:

We are required to solve:

$$4x - 2 = 2x + 6$$

Add 2 to both sides and we get

$$4x = 2x + 8$$

Subtract  $2x$  from each side and we have

$$2x = 8$$

Now divide both sides by 2 to get

$$x = 4$$

Note that the above solution is a good paragraph with complete, well-constructed sentences.

- (e) Lists of key words (vocabulary of mathematics) are included in the Grade VII and VIII texts. Similar lists should be made by Grade IX pupils. The spelling and the meaning of these words should be reviewed frequently. Good oral language correlation may be secured by asking pupils in turn to talk about each key word (two or three sentences).

II. "Arithmetic is a system of ideas. Being a system, arithmetic must be taught as a system." (16th Yearbook N.C.T.M.) This statement emphasizes the duty of the teacher to help the pupils organize their thinking by helping them to discuss relationships (especially similarities) and to gain insight into the principles involved. Skilful development will enable the more competent pupils to generalize and to organize items of understanding into more extensive systems; but teacher-led review discussions should be used to insure that even the slower learners gain an insight into the organization of ideas. This will be particularly desirable in Grades VII and VIII where the text headings are on the "small problem" basis with an organization wherein the system is present but not obvious.

To the experienced teacher many examples will occur of small topics which may properly be synthesized. Here are a few:

- (1) Business arithmetic includes many problems with the same basic relationships: discount, commission, profit, loss, taxation on a percentage basis, interest, ad valorem duties. Each situation deals with a base, a rate and a percentage; when two of these are given the third can be calculated.
- (2) The family relationships among quadrilaterals is a helpful topic for review.
- (3) The several operations used for the solution of equations are different aspects of isolating the unknown while keeping the sides balanced.
- (4) Operations with signed numbers include the arithmetic operations.
- (5) All algebraic operations are generalizations which include the arithmetic operations.

III. Diagnostic procedures, remedial work and drill are essential parts of good teaching. The Grades VII and VIII texts contain good diagnostic exercises which should be done by all pupils. For those who need remedial work many exercises are provided at the back of the books. These exercises may be repeated several times without loss of value and they may be used as patterns for similar exercises which the teacher might make. Many of these are best managed by having the pupil place a strip of paper over the answer line in the book. This avoids laborious and inaccurate copying of numbers. The answers go on the sheet of paper and can be quickly checked.

Some of the most effective diagnostic work is done orally both for operational and for thinking errors. It is frequently done by asking "Who has a different answer?" "How did you get it?" The remedial teaching should be done then and there to avoid other pupils being confused.

Good drill is valuable provided it is on material which is required for further learning, provided the pupil sees the purpose and value of it, and provided it is not prolonged beyond the pupil needs. Good drill is

obtained in applications. For example, excellent drill on addition and multiplication of common and decimal fractions may be secured in calculating perimeters and areas of simple geometric figures; finding the area of a trapezoid involves addition, division and multiplication. The solving of simple questions gives another excellent opportunity for drill on addition, subtraction, and division of whole numbers, fractions and decimal fractions; when we solve  $3x - 4.2 = 7.9$ , we need to add and to divide decimals. Innumerable variations can be devised to secure good drill. Good drill involves frequent change in method. Oral drills are as valuable as written ones and are frequently faster.

IV. Diagram sketching is one of the most powerful techniques for solving problems. Every pupil should be encouraged to draw a diagram whenever that is possible, because it clarifies the picture of the problem which is forming in his own mind and because it is a powerful aid to him in diagnosing his own difficulties.

V. Graphical work has greatly increased in importance during recent years. The ability to read and construct graphs is a most desirable skill for every citizen.

A well-made graph will have a title and will have each axis labelled with the proper name and unit. All graphs should be neat and balanced on the page. Printing is preferred to writing as it gives the graphs a neater appearance. The teacher should give pupils some guidance on the time to be spent on the art features of their graphs.

VI. Many opportunities are presented by the texts and many others will occur to the teacher for getting pupils to contribute to the group. Individual research and report, committee organization for research and presentation of results, mutual help groups, chart making, model making, discussion period, etc., are all activities which make the modern classroom a place where socialmindedness and pupil initiative are developed along with mathematical abilities and knowledge.

#### Outline of the Course for Grade VII.

##### Text

- ✓ MATHEMATICS WE USE, Book 1, by Brueckner (John C. Winston Co.)

#### References for remedial and enrichment materials.

- ✓ MATHEMATICS AND LIFE, Book 1, by Knight, Studabaker and Tate (W.J. Gage and Co.)

- ✓ EVERYDAY JUNIOR MATHEMATICS, Book 1, by Betz (Ginn and Company)

The minimum course consists of the work in the textbook, with the exception of the starred topics which the better students should do also.



1. Whole numbers:

- (a) Review to discover unknown combination, separation, multiplication and division facts. Remedial treatment for those who need it. (See page 290)
- (b) Diagnosis of difficulties in the processes of addition, subtraction, multiplication and division of whole numbers. Remedial treatment for those who need it.
- (c) Meaning of numbers: place value, rounding off numbers, rounding off quotients, understanding large numbers.

2. Fractions:

(a) Common:

Review of meaning.  
Review of addition, subtraction, multiplication and division.  
Compare common fraction with common fraction.  
Changing common fractions to decimal fractions and to percentage fractions.  
Problems involving common fractions.

(b) Decimal:

Meaning, reading and writing of decimals.  
Addition, subtraction, multiplication and division of decimals.  
Multiplication and division by 10, 100, 1000.  
Changing decimals to common fractions and to percentage fractions.  
Comparing decimals with other decimals and with common fractions.  
Problems involving decimals.

(c) Percentage:

Meaning, value in comparing fraction with fraction.  
Distinguish carefully between  $\frac{6}{100}$  and  $\frac{6}{100}$  of a quantity.  
Changing per cents to decimal fractions and to common fraction.  
Changing common fractions and decimal fractions to percentage fractions.  
Finding a per cent of a number.  
Finding the per cent one number is of another.  
Finding the per cent increase of one number over another.  
Problems involving percentage fractions.

3. Denominate numbers:

days, hours, minutes, seconds.  
miles, rods, yards, feet, inches.  
bushel, peck, gallon, quart, pint.  
square measure (see page 197).  
Kilowatt hours  
British Thermal Unit.  
Multiplication and division of denominate numbers.  
Problems.

4. Graphs and Tables:

Reading pictographs, tables and graphs  
Reading and constructing bar graphs.  
Reading and constructing line graphs.  
Reading circle graphs.

5. Problem solving:

The problems in the text in applied mathematics are all part of the course. These problems involve the different types of fractions, denominate numbers and the processes of addition, subtraction, multiplication and division. One will find recurring problems relating to:

- (1) Averages
- (2) Speed, distance and time
- (3) Unit cost, number of units and total cost.

These problems are built around:

(a) Mathematics in the Home:

Coal, oil, gas, electricity, water, measuring and buying lumber, budgets, wise purchasing, getting your money's worth, budgeting the car, personal cash record, cashbook.

(b) Mathematics of Business:

Opening a bank account.  
Deposit slip (how to fill in).  
Current and Savings Accounts  
Cheques  
Ways of sending money  
Borrowing money:  
    Promissory note (writing of a promissory note)  
    Interest (calculating interest)

Discount  
    (Two methods of calculating the net price)

Commission and Proceeds:

    Meaning  
    Calculating commission and proceeds.

Margin, expenses, profit, selling price, cost price.

    Meanings and problems. Pages 273, 274, 275, 278.

Trade Discount  
Profit based on selling price  
Inventory  
Making bills and receipts.



6. Geometry:

(a) Constructions:

Drawing circles with given radii.

Drawing a regular hexagon.

The protractor:

Measuring angles.

Constructing angles of given size.

Measuring lines.

Bisecting a line.

Bisecting an angle.

(b) Concepts:

An angle - meaning (amount of turning), examples, reading and lettering angles.

Kinds of angles: right, acute, obtuse, straight, complete revolution.

The degree

Two points determine a straight line

Segment of a line

Parallel lines

Perpendicular lines

Diameter, radius and circumference of a circle

Arc of a circle

Concentric circles

Vertex

Area

Rectangle

Square

Parallelogram

Triangle, rigidity of triangles

Plane and solid figures

(c) Geometric calculations:

Perimeters of rectangles, squares and triangles.

Circumference of a circle.

Area of a rectangle, square, parallelogram, triangle.

7. Vocabulary (Meaning and spelling)

Pupils are expected to master the meaning and spelling of all new words in the text. Here are some of the words, old and new:

abacus	electricity	perpendicular
acute	expense	personal
addition	expenditures	plane figure
altitude	exchange	place value
angle	formula	practice
annexing	geometry	practise
approximate	graph	practical

area	gross profit	promissory note
arc	horizontal	protractor
average	improper fractions	principal
bankbalance	income	product
base	interest	quotient
bisect	inventory	radius
bisector	invert	ratio
board foot	Kilowatt-hour	reduce
British Thermal Unit	label	receipt
budget	length	remainder
cancellation	like fractions	retail
cancelled cheque	light year	regular hexagon
capacity	linear measure	rectangle
cashbook	marked price	round off numbers
center	mathematics	rural
cheque	measure	savings account
circle	mixed fractions	segment
cheque stub	model	scale
comparison	multiplier	signature
commission	multiplication	square
concentric	money order	straight angle
consumer	margin	system
Credit Union	net price	solid figure
current account	night letter	subtraction
date of maturity	numerator	telegram
day letter	obtuse	thermometer
decimal	octagon	triangle
deposit	parallel	trapezoid
depositor	parallelogram	urban
denominator	passenger - miles	unlike fractions
diameter	payee	vertex
dishonoured	perimeter	vertical
discount	patronage dividends	volume
division	*estimate	wholesale
divisor		width
dividend		withdraw
endorse		zero

\*

## 8 Checking:

There should be a constant effort to have the pupil accept responsibility for the accuracy of his solution. Checking by reverse operations, by going over the work or by other approved methods and by noting the reasonableness of the answer should become a habit.

## 9. Ratio:

Meaning

Contrast with differences (page 50)

Finding the ratio of two numbers and expressing the result as a per cent. (page 136)

## 10 Roman numerals: (See page 64)

## 11. Drawing to scale: ----- Meaning

Problems as on pages 159, 160, 161, 162.

## Outline of the Course for Grade VIII

### Text

- ✓ MATHEMATICS WE USE, Book 2, by Brueckner (John C. Winston Co.)

### References for remedial and enrichment materials.

- ✓ MATHEMATICS AND LIFE, Book 2, by Knight, Studabaker and Tate (W.J. Gage and Co.)
- ✓ EVERYDAY JUNIOR MATHEMATICS, Book 2, by Betz (Ginn and Company)

The topics of the text constitute the course. The starred topics on pages 73, 74, 75, 78, 109 to 111, 142, 186, 254 and 269 are to be regarded as part of the minimum requirements of the course. Other starred topics and questions may be partially or wholly omitted by the weaker students.

#### 1. Whole Numbers:

Diagnostic tests in addition, subtraction, multiplication and division.  
Remedial work for individuals who need it. Speed practice for each operation after the remedial teaching has been done. All pupils should be included in groups for speed practices. Each pupil should keep a score sheet or graph to show his own progress.  
Place values to billions and billionths.  
Rounding off numbers.  
Calculating square roots by approximation methods only.

#### 2. Fractions -- common, decimal and percentage:

Continued emphasis on the meaning of a fraction.  
Diagnostic tests of addition, subtraction, multiplication and division of common and decimal fractions; addition and subtraction of percentages.  
Remedial work for individuals who need it.  
Speed practice for all (after remedial work) with individuals comparing their own successive scores.  
Changing one kind of fraction to another.  
Percents greater than 100 and less than 1.  
Finding a number from its fractional part.

#### 3. Denominate Numbers:

Measurement of speeds.  
Metric system applied to weights and distances.  
Acre and section.  
Equivalent measures within lengths, areas, volumes, weights, liquid measure and dry measure (tables for reference, page 294)

#### 4. Graphs and Tables:

Pictographs -- reading only.  
Bar graphs -- reading and making.  
Broken lines graphs -- reading and making.

Curved line graphs -- reading and making.

Circle graphs -- reading and making.

Reading of tables -- depreciation, simple interest, compound interest, life expectancy, life insurance premiums, fire insurance premiums, income tax rates, tariffs, squares and square roots.

5. Problem Solving:

Problems involving all fundamental operations with integers and with each kind of fraction. These problems involve information about and understanding of many business, home, and community situations; also ability to fill in the business forms set out in the text. Business problems include: discount, successive discounts, margin, profit and loss, simple interest, instalment buying, compound interest, rent or buy, taxation.

6. Geometry:

(a) Constructions:

Bisection of line segment

Bisection of angle

Making a line parallel to a given line

Erecting perpendiculars

Inscribing a regular polygon in a circle.

(b) Concepts:

Kinds of triangles as to sides

Kinds of triangles as to angles

Parallelogram, trapezoid, regular polygons (to the octagon)

Congruence

Symmetry.

(c) Geometric calculations:

Perimeter of rectangle, triangle, circle, polygon.

Area of rectangle, triangle, parallelogram, trapezoid circle

Volume of prism (rectangular or circular), cone and pyramid

7. Vocabulary:

Spelling and meaning of all the words in the vocabulary lists of the text.

Review of the Grade VII list of words.

8. Checking: As for Grade VII.

9. Ratio:

Meaning (relationship of sizes or amounts)

Ways it is written (4 to 7, 4:7,  $4/7$ , etc.)

Problems using ratio. These should be limited to problems in which the numerical relationships are simple. Cross multiplication should be avoided as should problems requiring an algebraic solution of a proportion

10. Standard Time.



11. Formulae:

Meaning (a shorthand method of making a statement)

Formula not to be used unless the corresponding statement is clear to the pupil.

The following simple formulae:  $S = \frac{D}{T}$ ;  $A = lw$ ;  $A = s^2$ ;

$A = \frac{1}{2}h(a+b)$ ;  $A = \pi r^2$ ;  $C = \pi d$ ;  $I = Prt$ ;  $V = Bh$ ;  $B = \frac{1}{3}Ah$ .

12. Algebra:

- (a) Algebraic Representation (See "Formulae" for previous experience with representation)
- (b) Setting up equations.
- (c) Solving equations (one step equations only) by the use of the Golden Rule of Equations. Note: Transposing is not to be used; the Balance is the key to understanding.
- (d) Signed numbers. Concept only, no operations.

OUTLINE OF THE COURSE FOR GRADE IX

Text

✓ MATHEMATICS FOR CANADIANS, Book 1, by Bowers, Miller and Rourke

References for remedial and enrichment materials.

- ✓ YOUR MATHEMATICS, by Hawkins and Tate (W.J. Gage and Co.)
- ✓ MATHEMATICS WE USE, Book 3, by Brueckner (John C. Winston Co.)
- ✓ EVERYDAY JUNIOR MATHEMATICS, Book 3, by Betz (Ginn and Co.)

Although the following outline follows the order of the text the teacher need not feel obliged to conform strictly to this arrangement of presentation in the classroom. It is quite possible that some teachers may prefer to follow the pattern established in Grades VII and VIII which would mean that instead of beginning at Chapter 1, the course would open with the review of integers contained in Chapter 6 and so on.

1. Constructions: (Chapter 1)

- 1. Drawing and Measuring Lines.
- 2. Drawing and Measuring Angles.
- 3. Estimating Angles.
- 4. Drawing an angle equal to a given Angle.
- 5. Drawing a Perpendicular from a Point to a Line.



6. Bisecting an Angle.
7. Bisecting a line.
8. Drawing a line parallel to a given line, through a given point.

2. Length, Area, Volume: (Chapter 2).

1. Perimeter of a Rectangle.
2. Perimeter of a square.
3. Perimeter of a Triangle.
4. Meaning of  $\pi$ .
5. Perimeter of a circle.
6. Area of a rectangle.
7. Area of a Square.
8. Area of a Parallelogram.
9. Area of a Triangle.
10. Accuracy of Measurement.
11. Rounding off Numbers.
12. Area of a Circle.
13. Area of a Cylinder:
  - a. Ends.
  - b. Curved surface.
14. Volume of a Rectangular Solid.
15. Volume of a Cylinder.
16. Metric System.

3. Fundamental Ideas in Algebra. (Chapter 3).

1. Addition of like Terms.
2. Subtraction of like Terms.
3. Substitution of Literal Terms.
4. Multiplication:
  - a. Monomials by monomial.
  - b. Binomial by Monomial.
  - c. Binomial by binomial.
5. Rules for order of operations.
6. Divisions:
  - a. Monomial by Monomial.
  - b. Binomial by Monomial.

4. Equations: (Chapter 4).

1. Rules governing Equations.
2. Solving Equations.
3. Use of Equations in Solving Problems.

5. Formulae. (Chapter 5.)

1. Making Formulae.
2. Changing Subject of a Formula.
3. Interpreting Formulae.
4. Direct Variation.
5. Inverse Variation.

6. Review of Integers: (Chapter 6).

1. Fundamental Operations.
2. Accuracy.
3. Speed.
4. Estimation.
5. Prime Numbers.
6. Powers.
7. Roots.

7. Fractions: (Chapter 7).

1. Basic Principles.
2. Reducing to Common Denominators.
3. Addition of Common Fractions.
4. Subtraction of Common Fractions.
5. Multiplication of Common Fractions.
6. Division of Common Fractions.
7. Simplification of Complex Fractions.
8. Addition and Subtraction of Decimals.
9. Multiplication of Decimals.
10. Division of Decimals.
11. Changing Common Fractions to Decimal Fractions.
12. Recurring Decimals.
13. Approximations and Significant Numbers applied to Decimals.

8. Signed Numbers: (Chapter 8).

1. Meaning of Plus and Minus.
2. Meaning of Directed numbers.
3. Addition of Signed Numbers.
4. Subtraction of Signed Numbers.
5. Multiplication of Signed Numbers.
6. Division of Signed Numbers.
7. Fundamental Operations with Signed Terms.
8. Removal of Parentheses.

9. Graphs: (Chapter 9).

1. Pictographs.
2. Bar Graphs.
3. Distribution Graphs.
  - a. Rectangular.
  - b. Circular.
4. Broken Line Graphs.
5. Curved Line Graphs.
6. Graphs of Formulae.

10. More Complex Algebraic Operations: (Chapter 10).

1. Substitution of Signed Numbers.
2. Simplification of Algebraic Expressions.
3. Algebraic Factors.
4. Reduction of Algebraic Fractions.
5. Multiples of Algebraic factors.
6. Addition and Subtraction of Algebraic Fractions.

7. Multiplication and Division of Algebraic Fractions.
8. Simple equations with one unknown.
11. Use of Fractions in Business. Percentage. (Chapter 11).
  1. Profit and loss problems.
  2. Discount problems.
  3. Interest problems.
  4. Taxation problems.
  5. Insurance problems.
12. Geometric Relationships. (Chapter 12).
  1. Frequency Distribution. The Mode.
  2. Arithmetic Mean.
  3. Angle-sum Rule for a Triangle.
  4. Classification of Triangles by Angles:
    - a. Acute-angles.
    - b. Right-angled.
    - c. Obtuse-angles.
  5. Supplementary Angles.
  6. Complementary Angles.
  7. Congruency of Triangles.
    - a. Three sides.
    - b. Two sides, and contained angle.
    - c. One side and two angles.
  8. Isosceles Triangle Theorem.
  9. Converse Theorems.
  10. Vertically Opposite Angles.
  11. Parallel lines with Transversal:
    - a. Alternate angles.
    - b. Corresponding angles.
  12. Ratio.
  13. Similar Figures.
  14. Pythagoras Theorem.

Vocabulary List of Significant Mathematical Terms.

(This list is arranged in the order in which the terms appear in the text-book. This list will supplement the outline.)

Chapter 1.

scale  
line  
dividers  
angle  
degree  
right angle  
arms of an angle  
straight angle  
perpendicular  
bisect  
plans  
centre  
radius  
diameter  
circle

Chapter 3.

literal number  
terms  
monomial  
binomial  
trinomial  
polynomial  
expression  
numerical factor  
literal factor  
coefficient  
like terms  
parentheses  
terms of a fraction  
numerator  
denominator

Chapter 8.

signed numbers  
directed numbers  
negative numbers  
positive numbers  
numerical value  
absolute value

Chapter 9.

pictographs  
bar graphs  
rectangular graph  
circle graph  
axes  
origin

semi-circle  
protractor  
set square  
symmetry  
axis of symmetry  
right bisector  
parallel lines  
rectangle  
square  
rhombus  
parallelogram  
broken line  
closed figure  
open figure  
polygon  
quadrilateral  
triangles  
isosceles  
equilateral  
scalene  
theodolite  
bearing

Chapter 2.  
perimeter  
circumference  
pi.  
periphery  
unit  
measure  
quantity  
rectangular solid  
cube  
altitude  
base  
nets of solids  
significant digits  
sector  
planimeter  
formula

Chapter 4.  
equation  
root of equation

Chapter 5.  
formula  
subject of a formula  
direct variation  
indirect variation

Chapter 6  
whole number  
integer  
digits  
place value  
decimal system  
factors  
odd numbers  
even numbers  
prime numbers  
composite numbers  
prime factors  
googol  
multiples  
powers  
squares  
perfect squares  
square root  
cube root

Chapter 7.  
fraction  
denominator  
numerator  
terms of traction  
proper  
improper  
mixed number  
reciprocal  
complex fractions  
decimals  
recurring decimals  
terminating decimals  
period of decimals

Chapter 10.  
No new terms.

Chapter 11.  
percent  
rate  
base  
percentage  
cost price  
margin  
profit  
overhead  
operating expenses  
discount  
list price  
marked price  
interest  
principal  
amount  
taxes  
mills  
insurance  
face  
risk  
premium

Chapter 12.  
averages  
frequency distribution  
mode  
arithmetical mean  
acute angle  
obtuse angle  
supplementary angle  
complementary angle  
congruent triangle  
converse  
parallel lines  
vertically opposite  
angles  
adjacent angles  
transversal  
alternative angles  
exterior angles  
interior angles  
corresponding angles  
ratio  
similarity  
pantograph  
hypotenuse

TEACHERS' REFERENCES

1. The text preceding and the text following the one in use, e.g., for the Grade VII teacher, the texts for Grades VI and VIII should be constant references.
2. PROGRAM OF STUDIES FOR THE ELEMENTARY SCHOOL -- BULLETIN 2, (especially the Point of View, page 113)
3. 15th YEARBOOK OF THE NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS - THE PLACE OF MATHEMATICS IN SECONDARY EDUCATION.
4. 16th YEARBOOK OF THE NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS
5. MATHEMATICS IN GENERAL EDUCATION - P.E.A. COMMISSION
6. HOW TO MAKE ARITHMETIC MEANINGFUL: BRUECKNER AND GROSSNICKLE



## Films and Filmstrips

The visual aids listed below and obtainable from the Audio-Visual Aids Branch, Department of Education, Edmonton.

### Films

The Language of Graphs -----	T-581
Measurement -----	T-561
Origin of Mathematics -----	T-274
Property Taxation -----	T-214
The Meaning of Pi. -----	T-689

### Filmstrips

#### Plane Geometry Series:

1 Introduction -----	P-84
2 Vocabulary, Lines and Angles 1 -----	P-85
3 Vocabulary, Lines and Angles 2 -----	P-86
4 Vocabulary, Lines Relationships -----	P-87
5 Vocabulary, Triangles -----	P-88
6 Vocabulary, Polygons -----	P-89
7 Vocabulary, Circles 1 -----	P-90
8 Vocabulary, Circles 2 -----	P-91
9 Postulates Lines -----	P-92
10 Postulates Triangles & Circles -----	P-93
11 Locus -----	P-94
12 Geometry in Art -----	P-95
13 Logic, Definitions -----	P-96
14 Logic, Deductive Reasoning -----	P-97
15 Logic, Induction -----	P-98
16 Logic, Mistakes in Thinking -----	P-99
International Date Line -----	P-281
Longitude and Time -----	P-964
Introduction to Graphs -----	P-1079
Reciprocals, the Rule of Division -----	P-949
The Story of Measurement -----	P-1182
Lines and Angles, Surface Measure -----	P-1183
Areas of Rectangles and Parallelograms -----	P-1184
Areas of Triangles and Trapezoids -----	P-1185
The Circle -----	P-1186
Cubic Measure, Volume -----	P-1187
Special Measurement -----	P-1188
Day and Night -----	P-1115



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